DOCUMENT RESUME

ED 392 284 FL 023 636

AUTHOR Liou, Hsien-Chin
TITLE Evaluation of Interactive Videodisc Courseware: A Strategy Perspective.
PUB DATE 95
NOTE 21p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; *Computer Software Evaluation; Cooperative Learning; *Courseware; *English (Second Language); Evaluation Criteria; Evaluation Methods; Foreign Countries; Higher Education; Instructional Effectiveness; *Interactive Video; *Learning Strategies; Recall (Psychology); Second Language Instruction

ABSTRACT

Development and evaluation of interactive videodisc (IVD) courseware for English-as-a-Second-Language (ESL) instruction are described. Effective listening and viewing strategies, identified through descriptive research, were incorporated into an existing ESL IVD. Subjects, 81 college ESL students, were pre-tested, then divided into control and experimental groups. The control group worked on the original IVD version, the experimental group on the revised version. After online practice, all subjects took a posttest. Then 33 of the 81 were further divided into two groups, one receiving another session of individual online strategy training as before, and the other working in a small group on the revised version. A delayed posttest focusing on comprehension and recall was then administered. No differences were found in the effects of strategy training or group/collaborative learning. Questions in the pretest, posttest, and delayed posttest elicited responses about strategy use; these were analyzed for insight into strategy training. It is concluded that the teaching of learning strategies is sensitive to many variables. A major limitation seen in this study is lack of training time for subjects. However, it is concluded that this approach to incorporating computer-assisted language learning strategies into the regular curriculum is useful. Contains 38 references. (MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 392 284

Evaluation of interactive videodisc courseware: A strategy perspective

Hsien-Chin Liou
Department of Foreign Languages & Literature
National Tsing Hua University, Hsinchu, Taiwan ROC
Paper presented TESOL '95 and CALICO '95

ABSTRACT

The paper addresses the evaluation issues of a piece of interactive videodisc courseware for computer-assisted language learning purposes from the perspective of learning strategy research. The study investigates strategy use by examining comparison experimental data. In a study of the research project (NSC 83-0301-H007-016) in its first phase, effective listening and viewing strategies were identified and classified through descriptive research techniques, and then implemented into a revised version of the courseware. Then, 81 EFL subjects classified into a control group and an experiment group were recruited to participate in the research. After they took the pretest, the control group were asked to use the non-strategy version of the courseware; the experiment group, the strategy version. After on-line practice, subjects took a posttest[1]. In the second part of the comparison design, 33 subjects out of the 81 were further divided into two groups. The first group received another session of individual on-line non-strategy training as before, and the second group who worked with peers collaboratively received the strategy version. Last, a delayed posttest was administered[2]. All the measurements of subject performance in the paper included comprehension questions and a recall summary. No differences were found as to effects of strategy training or collaborative

[1] The results of this part were reported in TESOL '95, Long Beach, CA, USA (Liou, 1995a) during March 28 to April. No proceedings was published for the conference.

[2] The results of this part were reported in CALICO '95, Middlebury College, VT, USA (Liou, 1995b) during June 19-23.

FL023636

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Hsien-Chin Liou
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

learning. Three questionnaires were used in the pretest, posttest, and delayed posttest sessions to elicit responses about strategy use. The results shed some light on the effects of strategies instruction and collaborative learning. Future directions and implications are discussed.

I. INTRODUCTION

The paper addresses evaluation issues of interactive videodisc (IVD) for computer-assisted language learning (CALL) purposes. Recently, learning process becomes of paramount importance and learning strategies, among other factors, are believed to shed light on the process. Yet, little of strategy research in CALL environments has been conducted, and further, video viewing comprehension process has seldom been documented so far. The current study investigates strategy use in a piece of self-developed IVD courseware (Liou, 1994) by looking into two types of data based on comparison experiment design.

Review of Literature

A brief review of relevant literature is given first. The research in the first language (L1) reading strategies instruction reviewed by Grabe (1994) is probably among the most comprehensive in language learning fields so it was consulted to help us design our study. He found:

1. Activating prior knowledge does not automatically improve students' comprehension of text or recall of information. Further research is needed.
2. Question strategies which focus on central concepts, which show students how to find appropriate answers, which highlight text structure, which allow for inferential reflection and synthesis on a regular basis, which show students how to generate their own appropriate questions (and the purposes for doing this) seem to indicate student improvement on various outcome measures.
3. Most research agrees that summary training, when done effectively, improves comprehension and recall, and shows transfer effects when students read other texts and on standardized reading comprehension measures (Flood & Lapp, 1990; Paris, et al., 1991; Pearson & Fielding, 1991; Pressley, et al., 1989; Shih, 1992; Taylor, 1992).

4. Monitoring is developmentally related; use of mental imagery, student verbalization, and underlining improve monitoring of text.
5. Motivation and students' perception of control over strategies appear to improve appropriate use of strategies and influence comprehension. Detailed explanation of when, where, and why to use strategies (conditional knowledge) is an important complement to what strategies to use and how to use them (procedural knowledge) (Duffy, 1993; Gaskin, et al., 1993; Pressley, et al., 1992; Garner, 1992).

Grabe further raises some caveats for researchers: "much strategy training research uses very sensitive outcome measures--related to text; many cognitive training studies are not empirically based." Thus, the criterion measures where text-related items are used may be biased. In point 2, we realize that questioning strategies may help promote use of student metacognitive knowledge while facilitating the reading comprehension process. In point 3, the summary task, when used properly, may help comprehension as well. Our research design to be discussed later will try to respond to these caveats.

Grabe also summaries the parameters which influence reading strategy research as follows:

1. reader variables: developmental levels, skilledness, motivation for task, awareness of control over reading strategies, confidence, background knowledge (topical knowledge in reading), time spent, perception of benefits of training
2. task variables
   material
   task (multiple-choice questions, or recall summary)
   past training, single/multiple tasks (what combination)
   difficulty level
3. training variables
   focus strategies
   length of training
   means of assessing training outcome (post-training, interdependence of training)
   awareness of mental processes involved
   awareness of purpose for strategies
   intensity of training, sessions per week
   criterion level for successful training
   relation of training to other school tasks

amount of guidance in preparation for independent application
amount of transfer effect to independent application
opportunities for independent application
amount of transfer effects to general comprehension assessment

4. Content variables
   instruction time for strategy training
   relation of training to other curricular activities
   training of the teacher
   types of materials used in class
   teacher's belief in efficacy of strategy training

In implementing training of strategies, Winograd and Hare (1988) provide very useful guidelines for direct strategy training which has five components.

1. What the strategy is. Teachers should describe critical, known features of the strategy or provide a definition/description of the strategy.
2. Why the strategy should be learned. Teachers should tell students why they are learning about the strategy. Explaining the purpose of the lesson and its potential benefits seems to be a necessary step for moving from teacher control to student self-control of learning.
3. How to use the strategy. Here, teachers break down the strategy, enact a task analysis for students, explaining each component of the strategy as clearly and as articulately as possible and showing the logical relationships among the various components. Where implicit processes are not known or are hard to explicate, or where explanatory supplements are desired, assists such as advance organizers, think-alouds, analogies, and other attention clues are valuable and recommended (Roehler & Duffy, 1984).
4. When and where the strategy is to be used. Teachers should delineate appropriate circumstances under which the strategy may be employed, (e.g., whether the strategy applies in a story or informational reading). Teachers may also describe inappropriate instances for using the strategy.
5. How to evaluate use of the strategy. Teachers should show students how to evaluate their successful/unsuccessful use of the strategy, including suggestions for fix-up strategies to resolve remaining

problems. (pp. 123-124).

Our design of strategies instruction to be discussed below follows this scheme. Similar guidelines and models are also recommended in Wenden (1991).

Specifically for ESL or EFL training of strategies, there exist some training textbooks for students (e. g., Ellis & Sinclair, 1989; Rubin & Thompson, 1982; Willing, 1989), resource books for teachers (e.g., Cohen, 1990; Oxford, 1990), learning training exercises incorporated into coursebooks, and supplementary materials (Sturtridge, 1989).

For general strategies instruction, O'Malley et al. (1985; see also O'Malley, 1987), for instance, have trained ESL students three listening strategies: note-taking, selective attention for specific linguistic markers, and cooperation. The three represents a balance of three types of strategies: cognitive, metacognitive, and affective types. Their subjects included 75 ESL high schoolers. In the study, the metacognitive group received training of one metacognitive, two cognitive, and one socioaffective strategies; the cognitive group, only one cognitive and socioaffective strategies; and a control group, no strategy training. Subjects received the instruction and practice of strategies in a 50-minute session for 8 days. They found the interaction between strategy effectiveness and task difficultly: with more difficulty in the task, the training may fail to compensate for the complexity. They suggest that explicitness of directions for using the strategy is important for the effectiveness of training: "The transfer of strategies already used ... [requires] continued prompts and structured directions until the strategies become autonomous" (O'Malley et al., 1985, p. 576). Wenden (1987) outlined a set of criteria that may guide learner training of strategies.

CALL programs may promise a powerful environment, compared with human teachers' instruction and student workbooks or worksheets, because they are extremely patient in providing continued prompts, powerful in incorporating structural directions, and adaptive in meeting individual student needs for the computer's immediate feedback and robust speedy processing. As for research on training of learning strategies in the first language college students using CALL, Mikulecky, Clark, and Adams (1989) found that the reading strategy training designed in their computer program was effective, and the strategies could be transferred to new material.

In EFL context, Chou (1992) investigated the effects of four kinds of help in a hypertext reading program: text only (no help), text with on-line vocabulary help, text with on-line sentence structural analysis, and text with strategy help (strategies of skimming, organization, guidelines to each paragraph,

and supplementary information). He then randomly divided 39 high schoolers into four groups to work on the four versions. He found that types of help did not make a difference on reading comprehension among groups of subjects. However, his questionnaire data show that subjects think the vocabulary help was the most useful, and was used the most frequently. Meskill (1991) implemented strategy training in a multimedia CALL conversation database lesson, and documented her observation. Thirty-four English-as-a-second-language (ESL) college subjects were asked to use an IVD lesson with six types of advice messages implemented in the lesson: rehearse, monitor, repeat, plan, associate, and resource strategies. Another version of the IVD lesson did not incorporate strategy advice. Subjects were randomly assigned to either of the versions. On-line observation and off-line interview methods were used to collect the process data in order to answer the research questions. Results showed that most of the subjects read the advice messages and liked to follow the advice. As far as learning gain, time on task, and amount of material accessed, no significant differences were found between the advice and the non-advice groups. This study again confirms that learners vary with appropriate strategy use: good learners (with higher language proficiency) know what to do but weak learners need direct advice.

II. THE STUDY

The study proceeded at two stages. At the first stage, 81 subjects worked on the courseware individually. At the second stage, half of the 33 subjects worked again individually on different content of the same design whereas another half worked in a small group. The entire study was conducted in a very much classroom-like situation although the design was experimental in nature. We feel that the design had exercised all the control we could have and the procedures were quite similar to what happens in other CALL contexts if language teachers would like to reinforce strategies instruction using supplementary CALL material. First, all the procedures were conducted in regular class time except when students needed to work on-line on a self-access basis. Namely, except the one-shot on-line session (about 50-70 minutes) in each stage, all the other activities were conducted in regular class sessions. Second, students were using different on-line versions based on their student identification numbers. The on-line session was designed in a way similar to that of the pre-test, posttest, and delayed posttest. In both stages, all subjects were asked to work on several multiple-choice or short-answer questions while on-line and to write a Chinese summary after they finished the viewing. Thus, students

would feel that they were working on different exercises at both stages.

A. The First Stage: Effects of Strategies Instruction

Eighty-one college freshman students from three majors--Chinese, Foreign Languages, and Economics--were recruited as subjects (we had had more but those who had viewed the video and those who lost data accidentally were not counted as valid subjects). Before the study started, we have collected the Chinese (the variable name referred to later as J-chi) and English (J-eng) scores of our subjects' in their Joint College Entrance Examination taken in 1994. We explained to the subjects the purpose and procedures of the study before asking them to sign up a consent form of participation. Then, after subjects viewed a 30-minute video clip twice, they took a pretest. It included a comprehension test with 20 multiple-choice questions in English and a Chinese summary recall task (between 110-130 Chinese characters in length). Meanwhile, a blank sheet of paper was given to each subject for the purpose of note-taking; subjects were encouraged to take notes if the act helped. After that, a questionnaire in Chinese (Questionnaire One) was given to survey all the subjects' use of the strategies and beliefs of their use (See Appendix D). Then, a Chinese handout listing the names, explanations, and examples of the target strategies in the study was distributed. Subsequently, all the subjects were working individually on the on-line practice, to be discussed in detail shortly. The posttest followed exactly the same procedures except that subjects watched a different video clip and worked on different posttest items: multiple-choice questions (MC), recall summary, and Questionnaire Two. The total numbers of the MC items were the same. Three investigators in this research project also checked to make sure the items were appropriate and compatible.

In the experiment, subjects were divided into two groups based on their student identification numbers. Then one group took the strategy version of the courseware (38 students in total), another (43 students) the non-strategy version. Three types of strategies were targeted in the treatment: metacognitive, cognitive, and affective strategies. Based on the results of our previous study, we selected "perceive visual/aural clues" and "use context" strategies. Based on our pedagogical experiences, we also selected the other common listening strategies which are deemed effective in viewing of feature films. In combination with the purpose of the viewing tasks--comprehension checks and summary recall, three strategies which have close connection with the paper-and-pencil tasks were taught at the same time: selective attention (read the questions in advanced before viewing), note-taking (on paper), and writing a summary (on

paper). The reason why we targeted at several strategies simultaneously was based on a belief that effective strategy use is derived from a combination of several and several types (cognitive, metacognitive, and socioaffective) together. Their categorization can be seen in Table 1.

Table 1 Summary of Categorization of Strategies Trained

metacognitive	cognitive	affective
plan	advance organizer	*be confident
monitor	associate	
evaluate	infer	
* selective attention	predict	
	perceive visual/aural clue	
	segment+recall	
	use context	
	* use imagery	
	* take notes	
	* summarize	

* those marked with * were not trained in the on-line practice.

The metacognitive set was given on screen as a questioning strategy--see Table 2 for detail. Seven cognitive strategies were embedded with video content (the major strategy set). Three off-line strategies, the minor strategy set, are related to the overall viewing purpose: note-taking, summary recall, selective attention (read the off-line MC questions in advance prompted by computer text display). The cognitive strategy, "use imagery" and the socioaffective strategy, "be confident" were presented in the Chinese handouts.

Table 2 Detail of Chinese Messages for the metacognitive strategy group

Planning
1. What do we need to do after viewing the film?
2. What information is given to us? How can we make use of the information?
3. Is there another way to do this?
4. What should we do next?
Monitoring
1. Are we using our plan or strategy?
2. Do we need to change our plan, or use another strategy?
3. Are we on the right track, close to our goal?
Evaluating
1. What worked? What didn't work?
2. How would we do differently next time?
(King, 1991, p. 309) adapted from King's "problem-solving prompt card"

The strategies instruction in the study can be summarized as follows.

1. A handout was given which explains the names of all the strategies and how they work before on-line practice.
2. Subjects were exposed to on-line strategy messages including the list of the metacognitive strategy set, and contextualized cognitive strategy training. Because we had only three work stations, all the subjects took turns using the material only once for about one hour.
3. Subjects were exposed to the off-line training of the three strategies combined with task requirements before, during, or after on-line practice: answering multiple-choice questions, taking notes, and writing a summary recall. The selective attention strategy was to ask subjects to read the multiple-choice questions before they viewed the video so that their attention would be focused on video information related to the questions.

For the note-taking strategy, we gave blank sheets in the pretest. In the training section, the sheet for taking notes has some outline for the trainees in

the experiment group to follow as they wished. In the posttest tasks and the delayed posttest (in the second stage), we gave all the subjects the outline version.

Our design followed the direct strategy training scheme (Winograd & Hare, 1988). All the subjects were given a handout with explanation and examples of all the target strategies. This serves the "what" component of the training. Very minimal instruction and illustration were given due to time constraint, but the importance was emphasized (the "why" component). The "when" and "where" components were implemented in the computer program. At appropriate points, for example, the program displays a message in Chinese such as "Can you predict what will happen next (in the video)?" or "What kind of person is so-and-so? If you think the character, so-and-so, is doing XXX, you are on the right track." The advance organizer strategy is to ask learners to view the video twice by getting a general impression the first time. The "how to use" and "how to evaluate strategy use" parts were not implemented in the project. A tracker program in the IVD unit was used to record how much time subjects spent in either round of video viewing. The strategy group used the version which was designed to require them to view the video twice; the first viewing served as an opportunity for using the advance organizer strategy. The control group used the version in which subjects can decide for themselves if they would view the video material once or twice. Among all the subjects, some even chose to view the material trice; all the decisions were made under student control. The total time for on-line viewing and strategy practice was referred to as TT. The time spent on first viewing T1, that at the second time, T2.

B. The Second Stage: Effects of Collaborative Strategies Learning

In the second stage, only 33 out the original 81 subjects participated. They were all foreign language majors. Seventeen of the 33 still worked on the non-strategy version of a different video clip individually (i. e., the original control group), whereas sixteen of them worked in either pairs or triads together on the strategy version (i. e., the original experiment group). The 33 subjects took delayed posttest tasks, again answering multiple choice questions and writing a Chinese summary like what they did in pretest and posttest. Various on-line behaviors were recorded by the internal trackers designed in the IVD program.

Except for the number of subjects and the design of small group on-line work, all the procedures in the second stage were the same as those in the first

stage.

C. Data Analyses for the Two Stages

Each of the multiple-choice questions (mc) was assigned a different score from 1 to 3 points based on how much it demanded subjects to process the video. The assignment scheme worked like the following: 1 point for perceiving simple audio input, 2 for perceiving complicated audio input or inferring simple facts, 3 for inferring simple facts with difficult distractors in the questions or inferring complicated facts (see Appendix for a sample). The score assignment in the multiple-choice questions in the pretest, the posttest, and the delayed posttest made a total of 44 points for each of the tests.

The summary protocols (S) were evaluated by a point system (Clark, 1982; Irwin & Mitchell, 1983; Kalmbach, 1986). Three investigators together determined the crucial facts which should be included in each version of the summary tasks of the pretest, posttest, and delayed posttest sessions. The facts were further divided into more important idea units and important units. The important unit (I) was assigned 1 point, whereas the more important unit (M), 2 points. Three scorers read a sample of thirteen summaries randomly selected from all the data. Discrepancy was noted and discussed to achieve a consensus. Then, each of the summaries in all the data was read by two scorers respectively. When there was discrepancy again, the two scorers both met to resolve the difference.

D. Results and Discussion

A basic assumption for the comparison study is that the two groups of subjects which were compared should be drawn from a compatible population. Although the grouping was based on student identification numbers, the statistic cluster analysis using the multiple-choice test scores and summary scores in the pretest session may yield better grouping. (The cluster analysis groups together the observations with similar features in the sample into respective clusters.) Thus, the cluster analysis was conducted on the 81 subjects, and yielded three groups, high, mid, and low levels as in Table 3. The high level indicates the subjects in this cluster were the most proficient in English, and the low, the least proficient.

The grouping was borne out by the "yes" responses in an item of Questionnaire One: "English is the subject whose grade was the highest in my high school". Then, both the T-test and the Wilcoxon rank sum test (w-test) were used to examine whether there were differences between the two groups

Table 3 Grouping Results of the Cluster Analysis (All the Subjects)

means	no.of G1	no. of G2	J-chi	J-eng	mc1	s1	grade #	level#
cluster1	28	28	75.2	64.4	28.8	10.3	34.5 %	mid
cluster 2	6	3	76.6	65.6	36.7	10.7	55.5 %	high
cluster 3	4	12	63.4	61.2	19.8	9.9	18.8 %	low

no. of G1 and G2: number of the group 1, strategy group, and of the group 2, the non-strategy group in each cluster

grade#: the frequency reported "yes" within each cluster for the item in Questionnaire One: "English is the subject whose grade was the highest in my high school".

level#: the label given for each group after cluster analysis.

The total scores of J-chi and J-eng are 100; MC: out of 44; S1: out of 21; S2: out of 20; S3: out of 18.

in terms of J-chi, J-eng, mc, s, m, i, t1, t2, and tt. Significant differences in the pretest session were found only in the variable of JCEE-Chinese scores for cluster 3 under the T-test. Since the group sizes are small (4 vs. 12), we feel confident to say that the two groups were the same before they received intervention or treatment. In the posttest session, significant differences were found only in the variables of t1 for cluster 2, t1 and tt for cluster 3 under the w-test. No differences were found in the summary, or multiple-choice performance. The significant statistics for the variables are listed in Table 4.

Again, significance was found only in the small group size of cluster 2 and cluster 3. A straightforward t-test was then conducted on all the original performance and the differential performance (difference between pretest and posttest) of the 81 subjects. None of the group differences were found in any of the dependent variables except t1 and tt. In other words, as far the time on task in the on-line instruction is concerned, the strategy group spent more time completing the task than the non-strategy group, which was shown significant

Table 4 Comparisons of the Two Groups in Effects of Strategies Instruction

cluster	variables	pretest/t-test	posttest/w-test
cluster 2	T1	NS(not significant)	z=-2.204 p=0.028*
cluster 3	J-chi	t=2.709 p=0.023*	NS
	T1	NS	z=2.287 p=0.022*
	TT	NS	z=2.02 p=0.043*

($p < .003$; $t=3.30$; strategy group spent 49 minutes as a group but non-strategy group, 41). For the first-time viewing, we also found significant difference in the two groups ($p < .05$, $t=2.28$): the strategy group took 20.6 minutes as a group, the non-strategy group took 16.3 minutes.

For subjects participating in the second stage, the cluster analysis was used again to classify the 33 students. It was found that only in the variables of the important idea units (I) in the summary recall and the total scores of the summary recall (S2) of only the posttest session were there significant differences between the two groups. The strategy group outperformed the control group in these two variables. Yet because the subject number was small, no conclusive answers could be achieved based on the statistical analyses.

A straightforward t-test was then conducted on all the original performance and the differential performance (difference between pretest and posttest, between posttest and delayed posttest, and between pretest and delayed posttest) of the 33 subjects. None of the group differences were found in any of the dependent variables except the difference between the delayed posttest and the pretest of the multiple-choice items (MC3-MC1). To our surprise, the non-strategy group outperformed the strategy group ($t=-2.9$; $p=0.007$; the difference of the strategy group is 4.88, whereas that of the non-strategy group is 9.82). In the three-session assessment, there was an increase trend in the multiple-choice performance for the two groups as shown in Table 5. It was found that the strategy group, group 1, started with higher performance. Although the strategy group ended with a higher score, the performance difference between

the two groups was not significant. While the control group--the non-strategy group 2--started with lower performance, they improved a great deal in the first stage. The phenomenon will be examined together with the results of the questionnaire data so that we can understand the effects of strategies instruction and collaborative learning in more depth.

Table 5 Increases in Multiple-Choice Performance among Three Sessions For the Two Groups

multiple-choice	pretest	1st stage improve-ment	posttest	2nd stage improve-ment	delayed posttest
group 1	29.47	2.7	32.20	3.1	35.30
group 2	26.53	4.5	31.00	2.8	33.80

total score= 44

To sum up, statistical results confirmed the assumption that two groups were at the same baseline in the pretest given the condition that they were randomly divided into two groups. As for the effect of strategies instruction, while the strategy group did better in almost all the measures in the posttest sessions, multiple-choice items, summary writing, more important idea units, and important idea units (all the means are higher), the differences were not shown to be statistically significant. During the treatment period, the strategy group took more time on task due to either their own decision (using more on-line help) or the program control (requiring them to view the material twice), but the factor did not contribute to the improvement in the posttest in a significant way. In the collaborative learning stage, the non-strategy group made significant improvement during the pretest to the delayed posttest sessions, but the strategy group did not.

Questionnaire data

We designed three questionnaires which were given at the pretest, posttest, and delayed posttest sessions respectively. The response in all the questionnaire items was elicited using a binary scale: yes or no. Answers of either category were cumulated for group comparisons. The chi-square test was used to examine if there was group difference. In about 30 items, we put two constructs, belief-of-strategy (BS) and habit-of-strategy-use (HSU) in the first questionnaire. In the second questionnaire, another two constructs, actual-

strategy-use (ASU) and like-to-use (LU) were incorporated. In Questionnaire Three, the same two constructs ASU and LU were used while incorporating some items on reactions towards collaborative learning (CL).

Examples of belief-of-strategy (BS), habit-of-strategy-use (HSU), actual-strategy-use (ASU), like-to-use (LU), and collaborative learning (CL)

BS: I believe that to understand English, inference making is important.
HSU: To understand English, I often make inferences while listening.
ASU: In this task, to understand English, I often make inferences while listening.
LU: I like making inferences while listening to understand English.
CL: I like to learn the computer language learning program with classmate(s).

In Questionnaire One, there was no significant difference found between the two groups regarding the construct of belief-of-strategy (BS). However, the non-strategy group showed a lower percentage of HSU compared with the strategy group: 59.0% vs. 71.4%. As for the habit-of-strategy-use (HSU), results indicate that in the only one item about a monitoring strategy the significant difference was found: the strategy group used more often ($p=0.026$). For the rest of the items about cognitive strategy use, there were group differences as well ($p=0.000$). The strategy group had higher ratios of using the strategies. The findings may suggest that the strategy group had believed in the usefulness of strategy use and had already been using the strategies during the pretest session; on the other hand, the non-strategy control group was probably not convinced by the usefulness of strategies, or did not use to, and did not use them as often as the strategy group at the initial stage. This may leave room for strategies instruction effects during the experiment period. This may explain why the non-strategy group improved in the delayed posttest multiple-choice measure (but not summary writing). Additionally, there was significant correlation found between BS and HSU ($p=0.000$). This may indicate that those believe in the usefulness of strategy use tended to use strategies in their learning.

In Questionnaire Two, it was found that the on-line training set of strategies was used more than the off-line training set (82% vs. 52%). They seemed to like using metacognitive strategies more than cognitive ones in the future (85% vs.76%). The strategy group liked both cognitive and metacognitive strategy types more than the non-strategy group (85% vs. 75.5%). Those who used the strategies tended to like them for there was significant correlation found

(p=0.000). The correlation between ASU and LU was found to be significant (p=0.005); this means those who really used strategies may indeed like to use strategies in the future in this sample.

Table 6 Frequency Fluctuation of Note-Taking

Groups	pretest	posttest	delayed posttest
group 1	55.3%	47.4%	56.3%
group 2	44.2%	53.5%	41.2%

The content of notes taken by all the subjects in the two stages during three sessions has not been analyzed in time for reporting. Yet, whether a subject took notes in each of the sessions was tallied. Their frequencies and the fluctuation were summarized in Table 6. To our surprise, fewer of the strategy group--group 1--took notes in the posttest session, i. e., after we provided on-line strategies instruction, while more of the control group took notes. It is likely that either the strategy group did not perceive note-taking as an effective strategy or they simply did not use the strategy on task regardless of its effectiveness. Whether the findings contributed to the causes for no-effect of our strategies instruction could not be answered given the note-taking data analyzed at its current stage.

In questionnaire Three, none of the item or groups of items differed regarding responses in the two subject groups. Across the three questionnaires, significant differences were seen between responses of Questionnaire One and those of Questionnaire Two after we grouped all the items relating to strategy use (p=0.001), but none were seen between either those of Questionnaire One and Questionnaire Three, or those of Questionnaire Two and Questionnaire Three.

Because we did not have enough IVD stations for the project, we had asked all subjects to work on the courseware only once for the treatment, or on-line practice of strategy training. Lack of enough practice is for sure the cause of no difference in the training effect. As for the effects of collaborative learning, against our expectation, the collaborative work did not prove better than individual work. The individual group, though not receiving strategy training, had exposure to the strategy handouts and learning material in two on-line sessions, which amounts to some form of input for their language acquisition. Moreover, the questionnaire responses indicate that the non-strategy

group did not use strategies before and may leave room for improvement due to IVD strategies instruction. Future studies should solve the resource limitation problems and let students use the computer material more. Because the increase trend is evident, given more practice, positive results in the training may be anticipated. It is also possible that the non-strategy group is more sensitized to strategy instruction than the actual strategy group.

There are some implications we can draw from the study. In the study, two criterion tasks were used to evaluate students' comprehension, instead of one; a combination of two tasks is helpful in obtaining a balanced measurement. In our training process, to focus strategies has been ensured in a Chinese handout. However, the length of training is short; namely, the intensity of training is weak. Thus, not only the amount of guidance in preparation for independent application but also instruction time is not enough. Further, students' awareness of mental processes involved in using strategies was not raised though their awareness of usefulness of learner strategies was raised through both the on-line and off-line materials. In the future, the think-aloud demonstration and practice or an interview session can be conducted to for students to practice the use of effective strategies in appropriate situations.

IV. CONCLUSION AND IMPLICATIONS

In conclusion, this study confirms that the training of learning strategies is very sensitive to many variables. The greatest limitation in the study is the lack of enough training time, or learning time provided for learners. Yet, the study demonstrates a good example of incorporating CALL strategy training into regular curriculum, and the feasibilities of implementing strategy training in multimedia CALL courseware and using such material for individual learning as well as collaborative learning.

Acknowledgement: The paper is partly funded by the National Science Council under the grant number NSC 83-0301-H007-016, Taipei, Taiwan, ROC. I would like to thank Professor Yen-Lung Shieh and Professor Yuli Yeh for commenting on the multiple choice questions and helping grading the summaries. Thanks should be extended to Professors R. C. Chou and S. K. Chu and his graduate students for helping analyze the data using statistical procedures and technical interpretations.

References

Bacon, S. M. (1992). Phases of listening to authentic input in Spanish: A

descriptive study. Foreign Language Annals, 25(4), 317-334.

Cardinale, L. A., & Smith, C. M. (1994). The effects of computer-assisted learning-strategy training on the achievement of learning objectives. Journal of Educational Computing Research, 10(2), 153-160.

Chamot, A. U. & Rubin, J. (1994). Comments on Janie Rees-Miller's "A critical appraisal of Learner training" and the author responds. TESOL Quarterly, 28(4).

Clark, C. H. (1982). Assessing free recall. The Reading Teacher, 35, 434-439.

Chou, C. T. (1992). Reading Comprehension Strategies and Computer-Assisted English Language Learning. Research Report (NSC 81-0301-H003-11) National Science Council. Taipei, Taiwan, ROC.

Cohen, A. (1990). Language learning: Insights for learners, teachers, and researchers. Newbury House.

Duffy, G. (1993). Rethinking strategy instruction: Four teachers development and their low achievers' understandings. Elementary School Journal, 93, 231-247.

Ellis, G., & Sinclair, B. (1989). Learning to learn English: A course in learner training (Teacher's book). Cambridge University Press.

Flood, J., & Lapp, D. (1990). Reading comprehension instruction for at-risk students: Research-based practices that can make a difference. Journal of Reading, 33, 490-496.

Garner, R. (1992). Metacognitive and self-monitoring strategies. In S. Samuels & A. Farstrup (Eds.), What research has to say about reading instruction. Newark, DE: IRA. 236-252.

Gaskins, I., Anderson, R. C., Pressley, M., Cunicelli, E., & Satlow, E. (1993). Six teachers' dialogue during cognitive process instruction. Elementary School Journal, 93, 277-304.

Grabe, W. (1994). Rethinking reading strategies: Research and instruction. Manuscript, Northern Arizona University.

Irwin, P. A., & Mitchell, J. N. (1983). A procedure for assessing the richness of retellings. Journal of Reading, 26, 391-396.

Kalmbach, J. R. (1986). Evaluating informal methods for the assessment of retellings. Journal of Reading, 30, 119-127.

King, A. (1991). Effects of training in strategic questioning on children's problem-solving performance. Journal of Educational Psychology, 83(3), 307-317.

Liou, H. C. 1994. Multimedia English material development: Theories and implementation. Taipei: The Crane Publishing Co., Ltd.

Liou, H. C. 1995a. Evaluation of interactive videodisc courseware: A

strategy perspective. Paper presented at *TESOL '95*, Long Beach, March 28 - April 1.

Liou, H. C. 1995bf. Evaluation of interactive videodisc courseware: Effect of strategies instruction and collaborative learning. Paper to be presented at *CALICO '95 Annual Symposium*, Middlebury College, Vermont, June 19-23.

O'Malley, J. M. (1987). The effects of training in the use of learning strategies on acquiring English as a second language. In A. Wenden & J. Rubin (Eds.0, Learner strategies in language learning (pp. 133-144). Prentice Hall.

O'Malley, J. M., Chamot, A. U., Stewner-Marizanares, G., Russo, R. P., & Kupper, L. (1985). Learning strategy applications with students of English as a second language. TESOL Quarterly, 19(3), 557-584.

O'Malley, J. M., & Chamot, A. U. (1990). Learning strategies in second language acquisition. Cambridge University Press.

Oxford, R. (1990). Language learning strategies: What every teacher should know. Newbury House.

Paris, S., Waskik, B., & Turner, J. (1991). The development of strategic readers. In R. Barr, et al. (Eds.), Handbook of reading research (pp. 609-640). Volume 2. New York: Longman.

Pearson, P., Roehler, L., Dole, J., & Duffy, G. (1992). Developing expertise in reading comprehension. In S. J. Samuels & A. Farstrup (Eds.), What research has to say about reading instruction (pp. 145-199). 2nd Ed. Newark, DE: IRA.

Pressley, M., Johnson, C., Symons, S., Mcgoldrick, J., & Kurits, J. (1989). Strategies that improve children's memory and comprehension of text. Elementary School Journal, 90, 3-32.

Pressley, M., Schuder, T., Bergman, J., & El-Dinary, P. (1992). A researcher-educator collaborative interview study of transactional comprehension strategies instruction. Journal of Educational Psychology, 84, 231-246.

Roehler, L. R., & Duffy, G. G. (1984). Direct explanation of comprehension processes. In G. G. Duffy, L. R. Roehler, & J. Mason (Eds.), Comprehension instruction: Perspectives and suggestions (pp. 265-280). New York: Longman.

Rubin, J., & Thompson, I. (1982). How to be a more successful language learner. Heinle & Heinle.

Shih, M. (1992). Beyond comprehension exercises in the ESL academic reading class. TESOL Quarterly, 26, 289-318.

Sturtridge, G. (1989, April). Designing learning-to-learn materials: Some

problems. Paper presented at the 23rd Annual IATEFL Conference, University of Warwick, England.

Taylor, B. (1992). Text structure, comprehension, and recall. In S. J. Samuels & A. Farstrup (Eds.), What research has to say about reading instruction (pp. 220-235). 2nd Ed. Newark, DE: IRA.

Wenden, A. L. (1986). Incorporating learner training in the classroom. System, 14(3), 315-325.

Wenden, A. (1987). Incorporating learner training in the classroom. In A. Wenden & J. Rubin (Eds.0, Learner strategies in language learning (pp. 159-168). Prentice Hall.

Wenden, A. L. (1991). Learner strategies for learner autonomy. New York: Prentice Hall.

Wenden, A., & Rubin, J. (Eds.). (1987). Learner strategies in language learning. Prentice Hall.

Weinstein, C. W., Goetz, E. T. & Alexander, P. A. (1988). Learning and study strategies. San Diego: Academic Press.

Winograd, P., & Hare, V. C. (1988). Direct instruction of reading comprehension strategies: The nature of teacher explanation. In Weinstein, C. W., Goetz, E. T. & Alexander, P. A. (Eds.). Learning and study strategies (pp. 121-139). San Diego: Academic Press.

Appendix

Posttest Questions

*The assigned scores range from 1 to 3 points depending on their difficulty level.

assigned score question item

3 1 Ray responds, "I know what I crop." What does he really mean?
a. I won't lose the farm. b. I crop my field of dreams.
c. I crop corn.

2 2. Why cannot the baseball players play a real game, according to Ray?
a. They are ghosts. b. People cannot see them.
c. There are only 8 of them.

3 3. What is the second message from the corn field?

---

2 4. How does the lady accuse Anne of making opposing comments?
a. By saying "Your husband plowed the corn to build a baseball field."
b. By commenting that she knew the answer beforehand.
c. By making a bad response.

3 5. What are all the arguments about?
a. A writer's book b. Censorship
c. Experiences in the 60s